Technical Report - Hydrographic and Side Scan Sonar Survey, New Market Pond, Piscataway, New Jersey

SPONSOR

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565 Taxter Road, Suite 510
Elmsford, NY 10523

SURVEY COMPANY

Aqua Survey Inc.
469 Point Breeze Rd.
Flemington, NJ 08822

ASI Project Number 30-236

November 27, 2012

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This report, as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc., 469 Point Breeze Road, Flemington, NJ 08822.

Kenneth Hayes 11/27/12

Kenneth Hayes **Date**
President

27 Nov 12

Mark Padover **Date**
Lead Field Scientist

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I. EXECUTIVE SUMMARY

A hydrographic and side scan sonar survey was conducted covering the area where future sampling activities will be conducted on New Market Pond in Piscataway, New Jersey. The area surveyed extended from shoreline to shoreline for more than 3,400 feet upstream from the dam at the western end of the pond.

The primary goal of the survey was to establish bottom elevations and contours within the impoundment and to collect sonar imagery to support the differentiation of surficial sediment textures for future sampling activities. The geophysical survey was conducted on December 6 and 7, 2010.

Technologies and techniques employed included a real-time kinematic differential global positioning system (RTK-DGPS), fathometer, and side scan sonar. Survey lines spaced 50 feet apart were run perpendicular to the shoreline using the fathometer. Survey lines spaced 50 feet apart were run parallel to the shoreline using the side scan sonar.

The RTK-DGPS consisted of a stationary base station operating over a known control point. Positioning corrections calculated by the base station were transmitted at 10 times per second via radio modem to another GPS receiver on the survey vessel. This allows the positioning accuracy for the survey vessel using RTK-DGPS to be on the order of 3 centimeters in the horizontal and 2 centimeters in the vertical planes.

During the survey, the ositional dilution of precision (PDOP) and status of the RTK-DGPS were monitored. If the PDOP exceeded 5.0, or the RTK-DGPS lost fix, survey activities were suspended or data were not used. The rover antenna was mounted directly over the fathometer and side scan sonar to eliminate offset errors and ensure positions tied directly with the collected data.

The bathymetric survey lines were created based on the centerline of the pond. A single centerline was drawn. Survey lines were then created perpendicular to the centerline, to create transects of the river. These survey lines were labeled with their distance from the dam at the western end of the pond. For example line 1+00 is 100 feet upstream from the dam and line 23+50 is 2,350 feet upstream from the dam.

An Innerspace Technologies model 455 fathometer was used to conduct the hydrographic survey. Positioning data were collected from the positioning system and electronically paired with the soundings from the fathometer in Hypack 2010 survey control software. Prior to the commencement of survey operations, a bar check was conducted to adjust for draft and speed of sound in order to ensure accurate sounding data. A bar check was also conducted during the day if equipment was powered down and at the end of each day to be sure the settings continued to be correct. In areas where the water was too shallow for the

fathometer or areas with dense aquatic vegetation where the vessel could navigate, a lead line was used to take spot measurements. In areas too shallow to navigate the vessel, it was decided that it would be unsafe for a person to wade to obtain spot measurements due to very thick deposits of very soft sediments.

Following the survey, the data were processed to include corrections to NAVD88 elevations, point plotted, and then contoured. Water level at the time of the hydrographic survey was 51.2 feet NAVD88. The pond was found to have water depths up to 7.4 feet. The shorelines range from steep to gradual slopes. The bottom of the pond is relatively flat.

The deepest point is in what appears to be a deep pocket just west of the bridge that crosses the pond between stations 11+50 and 12+00. This deep area is likely caused by increased flow as a result of the narrowing of the pond at the bridge.

An Edgetech 4100-FS dual frequency 100kHz/500kHz side scan sonar system was used for this survey. The range scale was set to 50 meters, which resulted in greater than 300 percent insonification of the river bed. Following the survey, the individual records were analyzed to detect any large objects or man-made targets that might be present. The sonar records were mosaicked using Chesapeake Technologies Sonar Wiz Map 4.0 software to provide a better overall view of the survey area and to produce a single geo-referenced image of the survey area.

The side scan sonar survey revealed scattered isolated objects throughout the survey area, most of which appear to be logs, branches, and rocks or rock piles.

Sediment along the shorelines generally appears to be rock/gravel/sand combinations. The bottom of the pond generally appears to be covered in silt.

The far eastern end of the pond was found to be very shallow and had significant submerged vegetation and organic debris.

II. MATERIALS, METHODS, AND RESULTS

A. Horizontal and Vertical Positioning

All aspects of the remote sensing survey were conducted using a real-time kinematic differential global positioning system (RTK-DGPS). The RTK-DGPS consisted of a stationary base station operating over a known control point. Positioning corrections calculated by the base station were transmitted at 10 times per second via radio modem to another GPS receiver on the survey vessel. This allows the positioning accuracy for the survey vessel to be on the order of 3 centimeters in the horizontal and 2 centimeters in the vertical planes.

The base station, consisting of a Trimble 5700 24-channel dual frequency GPS receiver, Trimble TSCe survey controller, and Trimble TRIMMARK 3 radio modem, was set up over a known control point named "6" as provided by the client. The rover, consisting of a Trimble MS-750 9-channel dual frequency GPS receiver and Teledyne radio modem, was set-up on the survey vessel and supplied positioning data to all the survey instruments during the geophysical remote sensing surveys.

Prior to the start of survey operations, the RTK-DGPS and base station location was QC checked against another known control point named "7" as provided by the client. The QC checks verified accuracy of the control point as well as the proper operation of the RTK-DGPS.

During the survey, the PDOP as well as the status of the RTK-DGPS was monitored. If the PDOP exceeded 5.0, or the RTK-DGPS lost fix, survey activities were suspended or data were not used. Results of the survey were fixed to NAD83 datum and New Jersey State Plane. Vertical data are referenced to NAVD88.

Figure 1. Survey area on New Market Pond.

B. Hydrographic Data Collection and Results

A bathymetric survey was conducted along the entire length of the project area (Figure 1). Survey lines spaced 50 feet apart were run to ensure high-resolution coverage of the entire survey area. These lines were created based on the centerline of the river. A single centerline was drawn. Survey lines were then created perpendicular to the centerline at 50 foot intervals, which resulted in lines that created transects of the river. These survey lines were labeled with their distance from the dam. For example line 1+00 is 100 feet upriver from the dam and line 24+00 is 2,400 feet upriver from the dam. In areas where the river bends, gaps in the survey lines are created on the outside of the bend. In these gaps, additional data were gathered as necessary to ensure complete coverage of the area to be surveyed.

Horizontal positioning was collected from the positioning system and electronically paired with soundings from an Innerspace Technologies IT-455 single beam fathometer in Hypack 2010 survey control software at a rate of 10 points per second. The optional 200khz 3degree transducer was used to help ensure accurate readings in the pond.

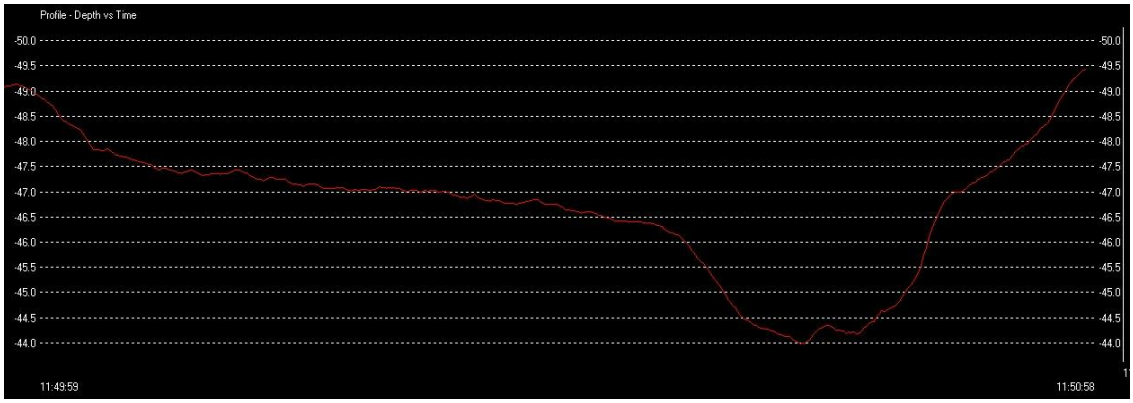

Figure 2. Profile of pond at station 11+00.

Prior to the commencement of survey operations, a bar check was conducted to adjust for draft and speed of sound in order to ensure accurate sounding data. A bar check was also conducted during the day if equipment was powered down and at the end of each day to be sure the settings continued to be correct. The antenna for the positioning system was mounted directly above the transducer to eliminate any positioning offset errors. A lead line was used to take spot measurements in areas where the water was too shallow for the fathometer or that have dense aquatic vegetation. In areas too shallow to navigate the vessel, it was decided that it would be unsafe for a person to wade to obtain spot measurements due to very thick deposits of very soft sediments.

Several lines were run parallel to the shoreline using the fathometer. These lines were used for QC purposes. The depths at the intersection of the parallel and cross lines were compared to ensure that the data are accurately recorded and positioned. At the 49 intersections analyzed, the data were found to have a standard deviation of 0.116 feet and a mean difference of 0.106 feet. These accuracy levels exceed what the Army Corps of Engineers requires for its highest-accuracy special order surveys in waters of this depth.

Post-processing involved removing bad sounding points created by propeller turbulence and aquatic vegetation. The lead line data and fathometer data were then combined into a single data set. Sounding data were converted to the reference elevation of NAVD88. The data were then sorted to eliminate points closer than 10 feet apart and to reduce the data to an X, Y, Z file. Finally, the sorted data were point plotted and contoured on a geo-referenced AutoCAD drawing.

Water level at the time of the hydrographic survey was 51.2 feet NAVD88. The pond was found to have water depths up to 7.4 feet. The shorelines have steep to gradual slopes. The bottom of the pond is relatively flat, gradually deepening from the east to west. The deepest point is in what appears to be a deep pocket just west of the bridge that crosses the pond between stations 11+50 and 12+00. This deep area is likely caused by increased flow as a result of the narrowing of the pond at the bridge.

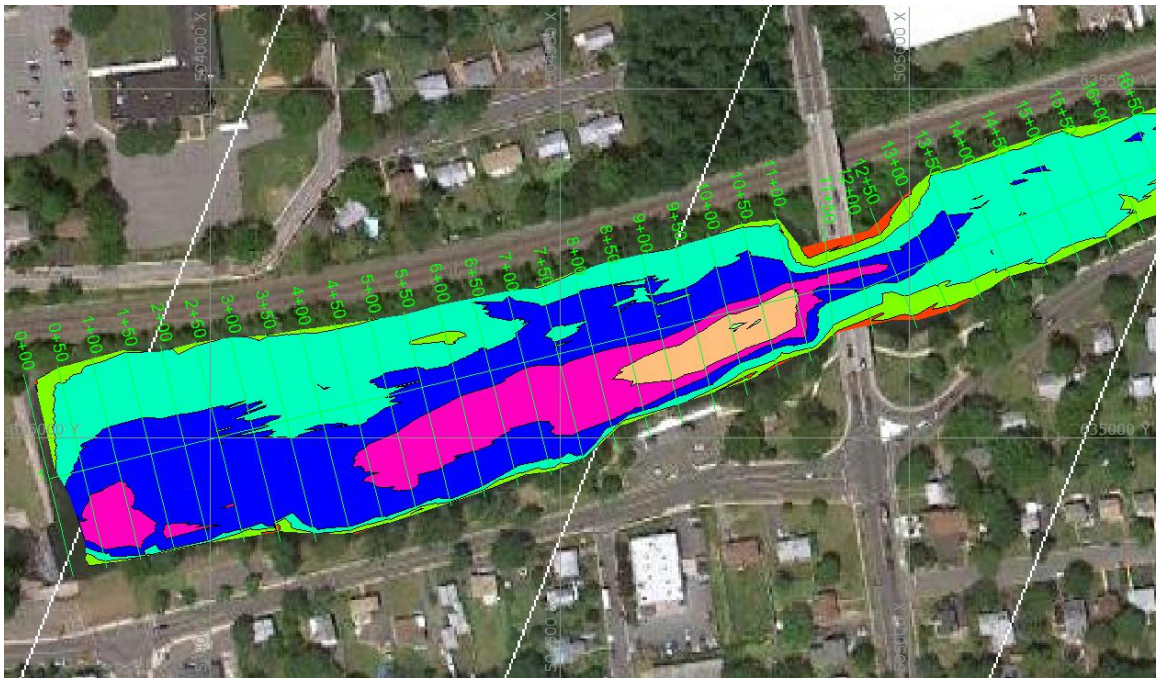

Figure 3. Contours at 1.0 foot intervals from 0+00 to 16+00 (orange 1'-2' to peach 6'-7').

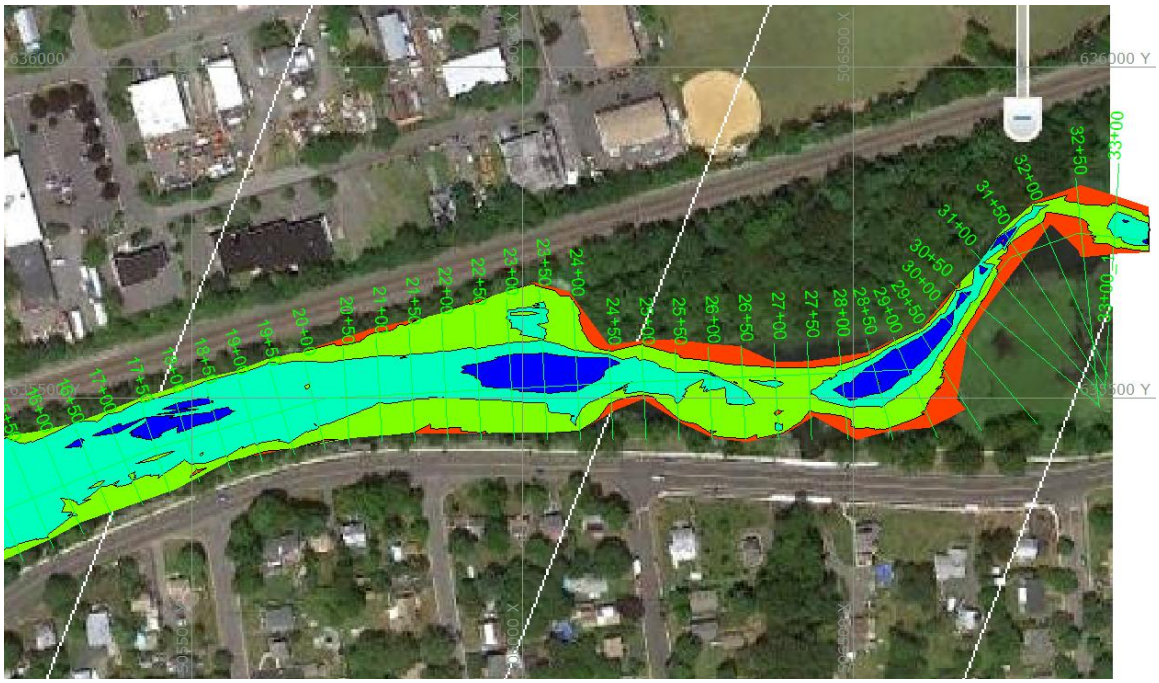

Figure 4. Contours at 1 foot intervals from 16+00 to 34+00(orange 1'-2' to blue 4'-5').

C. Side Scan Sonar Data Collection and Results

The side scan sonar survey encompassed the entire river bottom within the survey area. This survey was conducted using an Edgetech 4100-FS dual frequency 100kHz/500kHz sonar system. The RTK-DGPS was used for positioning and Hypack 2010 survey management software was used for survey control and ship track recording. This survey was conducted by running lines spaced approximately 50-feet apart parallel to the shoreline. Range was set to 50 meters per side, resulting in greater than 300% coverage.

The side scan survey was designed to optimize resolution of the side scan sonar records. Prior to commencing survey operations, the sonar was tuned and adjusted to find the optimal combination of control settings that yielded the best image. Gain settings were adjusted as little as possible, to allow accurate post-processing. Data were logged to the onboard computer using Edgetech Discover sonar acquisition software for later review.

Side scan sonar records were analyzed for evidence of objects exposed above the sediment of the river as well as for differences in sediment textures. Detected features were plotted at their locations on the geo-referenced drawing. The sonar records were mosaicked using Chesapeake Technologies Sonar Wiz Map 4.0 into a single geo-referenced image (Figures 5 to 8).

There is no indication of dredge scars from previous trenching operations within the survey area which would indicate the presence of utilities or prior dredging activities. The side scan sonar survey revealed scattered isolated objects throughout the survey area, most of which appear to be logs, branches, and rocks or rock piles. Sediment along the shorelines generally appears to be rock/gravel/sand combinations. The bottom of the pond generally appears to be covered in silt. The far eastern end of the pond was found to be very shallow and had significant submerged vegetation and organic debris.

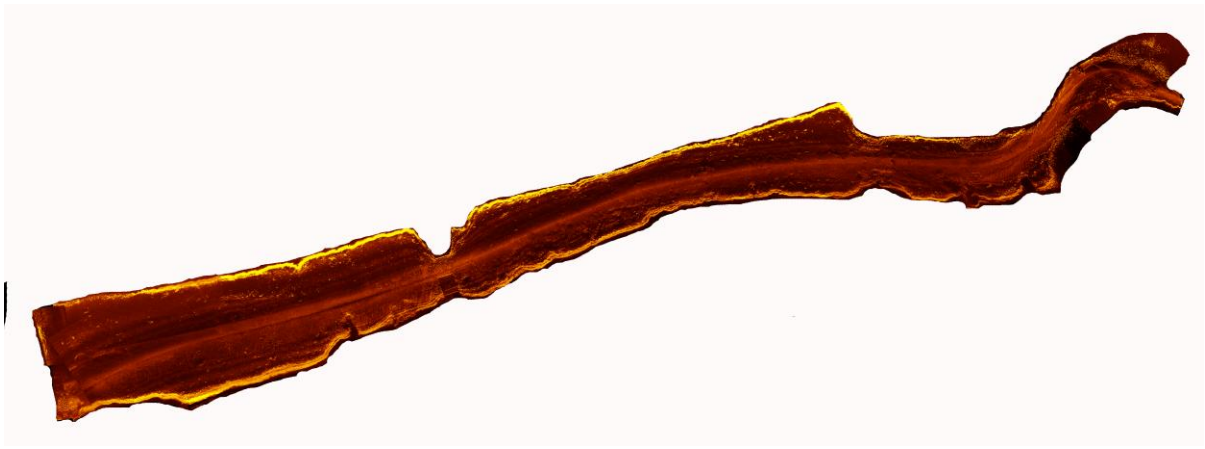

Figure 5. Side scan sonar mosaic of the entire pond.

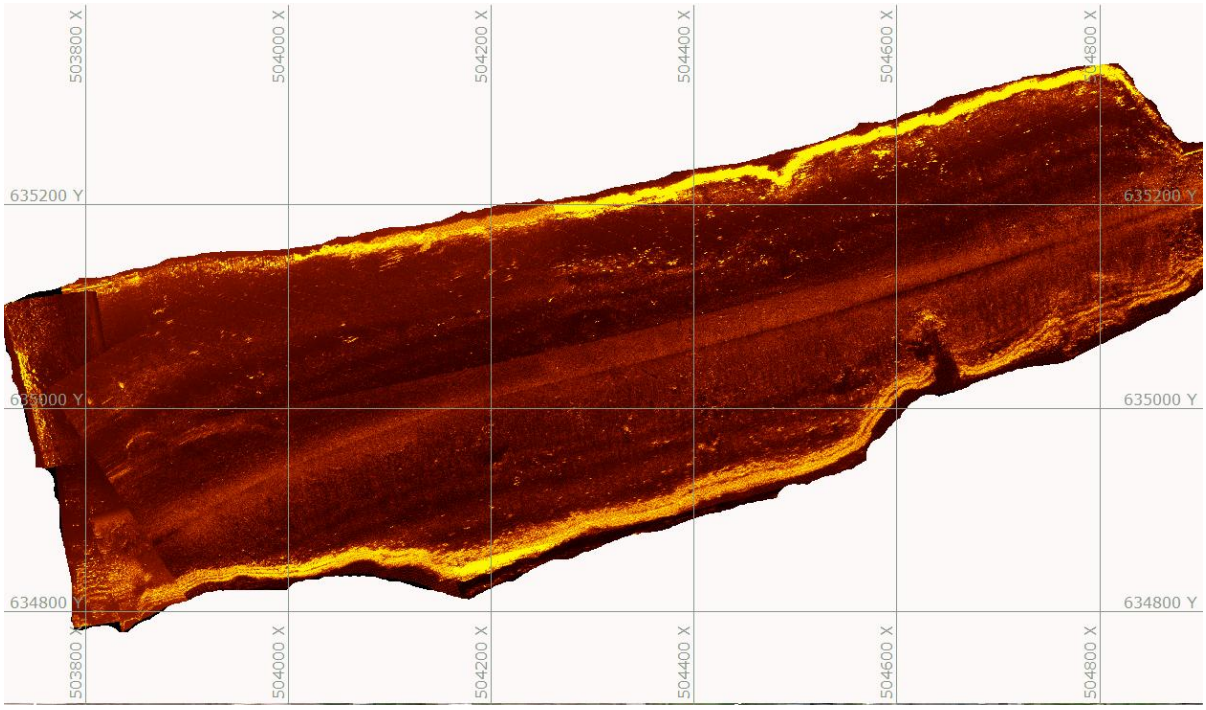

Figure 6. Side scan sonar mosaic of the western third of the pond.

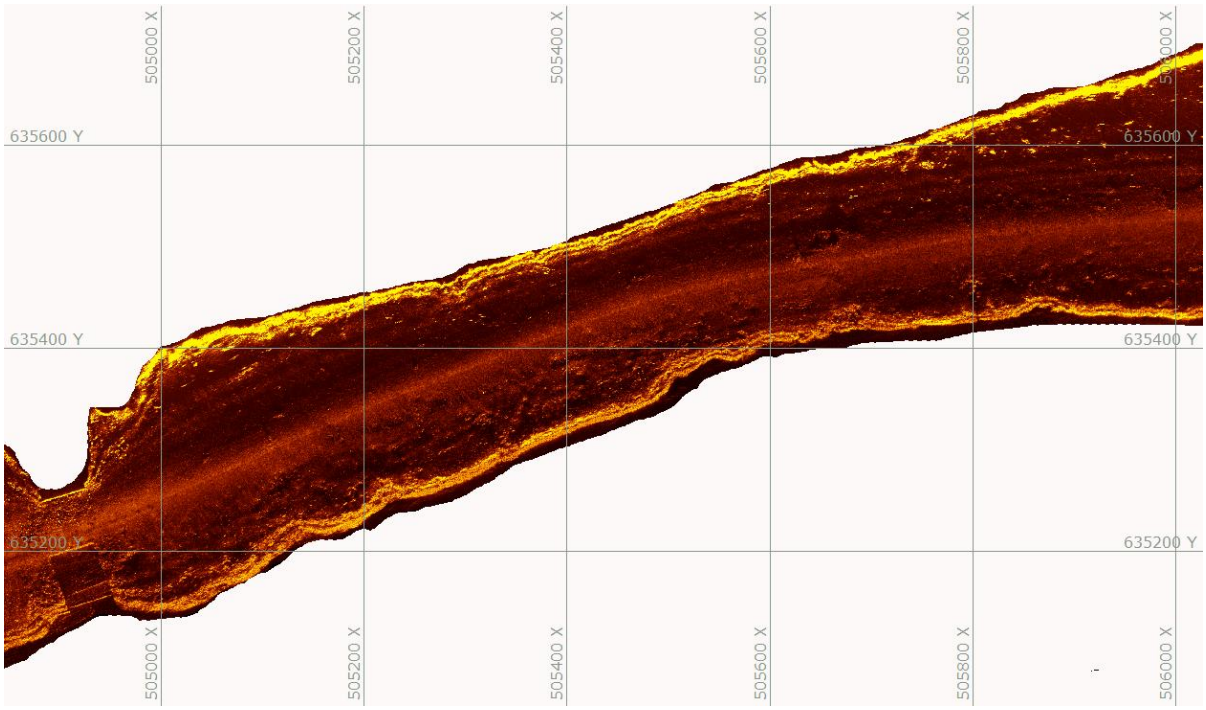

Figure 7. Side scan sonar mosaic of the central third of the pond.

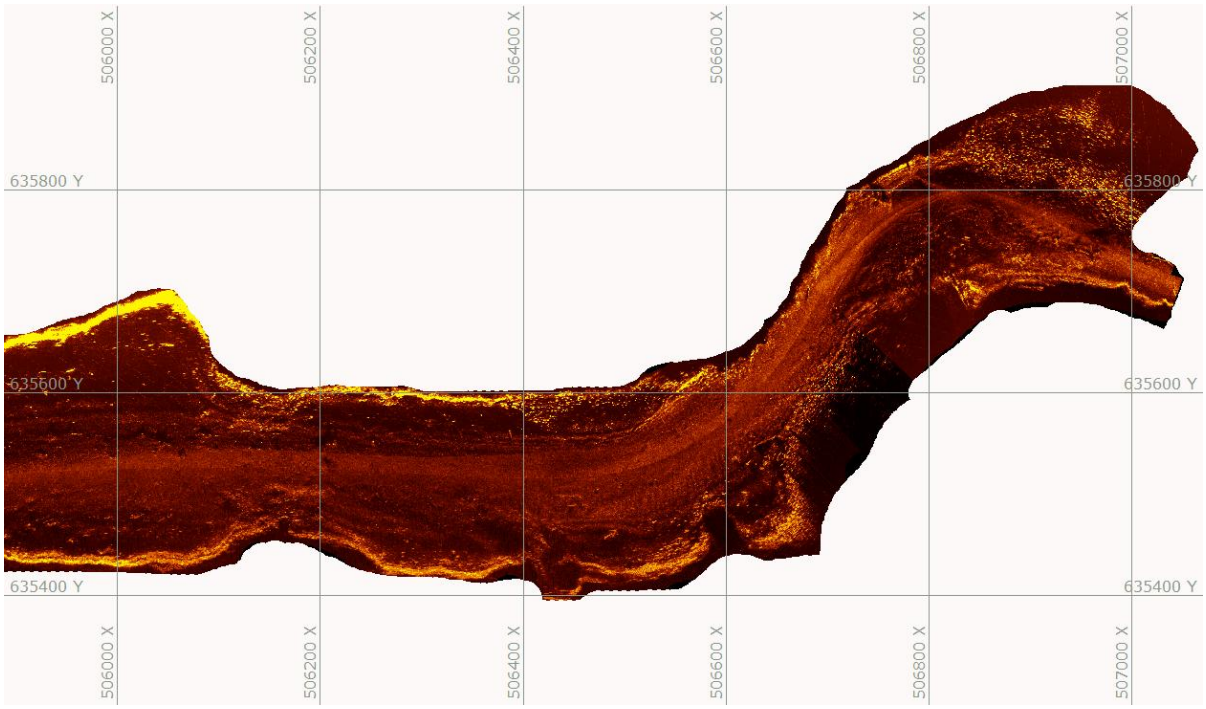

Figure 8. Side scan sonar mosaic of the eastern third of the pond.

III. PROJECT CONCLUSIONS

Water level at the time of the hydrographic survey was 51.2 feet NAVD88. The pond was found to have water depths up to 7.4 feet. The shorelines have steep to gradual slopes. The bottom of the pond is relatively flat. The deepest point is in what appears to be a deep pocket just west of the bridge that crosses the pond between stations 11+50 and 12+00. This deep area is likely caused by increased flow as a result of the narrowing of the pond at the bridge.

The side scan sonar survey revealed scattered isolated objects throughout the survey area, most of which appear to be logs, branches, and rocks or rock piles. Sediment along the shorelines generally appears to be rock/gravel/sand combinations. The bottom of the pond generally appears to be covered in silt. The far eastern end of the pond was found to be very shallow and had significant submerged vegetation and organic debris.

Appendix A

Equipment Specifications

MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

Key features and benefits

- **20 Hz position update rate**
- **Less than 20 milliseconds position latency**
- **Centimeter-level position accuracy**
- **Front panel display & keypad for status monitoring and configuration**
- **User-defined local coordinates direct from receiver**
- **Industry standard CAN bus interface**

The MS750™ represents the highest level of accuracy and response available from a dual frequency GPS receiver. The receiver is specifically designed to allow the easy integration of reliable centimeter-level positions to any guidance or control application.

Accuracy and Response Times

Dynamic platforms, require virtually instantaneous position reports multiple times per second. The MS750 delivers positions to guidance or control loop software twenty times per second with a latency of less than 20 milliseconds. This responsiveness is matched with a horizontal accuracy of two centimeters and vertical accuracy of three centimeters. For the most precise applications, the MS750 provides one centimeter accuracy horizontally at a 5 Hz rate with a small increase in latency.

Interfacing and Configuration Ease

The MS750 is designed to plug right into your application with minimal development. An easy to-use application file interface enables the user to completely program receiver operation with a single command. Alternately, the receiver can be configured via the user-friendly built-in display and keyboard interface, or by the included Windows-based Configuration Toolbox software. Multiple configurations can be stored in the receiver as files and activated when desired. Local datum and transformation parameters may be loaded directly into the receiver. Therefore, output grid coordinates are compatible with GPS and traditional survey systems that may be in use on the same site. ASCII or Binary messages may be output through any of the three bi-directional serial ports. The receiver also includes support for the industry standard CAN (Controller Area Network) interface.

Dual Frequency RTK Receiver for Precise Dynamic Positioning

Advanced Technology

The accuracies, update rates and latencies available in the MS750 are made possible through a GPS architecture specifically designed for demanding dynamic positioning applications. Reliable operation in the most adverse environments, such as radio interference experienced at construction or mining sites, is a strict requirement. Custom designed hardware with Supertrak™ multibit GPS signal technology and Everest™ advanced multipath suppression provide superior tracking especially for weaker, low elevation satellites.

Both the RTCM format for differential GPS corrections and Trimble's published Compact Measurement Record (CMR) differential data can be received simultaneously, allowing the receiver to choose the optimum source and provide seamless navigation. Available as an option is the ability to calculate the baseline vector between two moving receivers to centimeter accuracy. The MS750 addresses a vast range of applications in the field of machine positioning, guidance and control.

Trimble

MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

STANDARD FEATURES

- Centimeter accuracy, real-time positioning
- 20 Hz position updates
- < 20 ms position latency
- Front panel display & keypad
- User-defined local coordinates direct from receiver
- 3 serial I/O ports
- 2 CAN ports
- 1 PPS Output
- Trimble CMR Input/Output
- RTCM Input/Output
- One year hardware warranty
- Compact, easy mounting design
- Synchronized 5 Hz position updates

OPTIONS AND ACCESSORIES

- Moving Base RTK
- Rugged L1/L2 machine mount antenna
- Micro-Centered Antenna
- 5 m, 7.5 m, 10 m, 24 m & 30 m antenna cables
- Data extension cable
- Extended hardware warranty
- Firmware and Software update service

ORDERING INFORMATION

MS750 **Part Number 36577-00**

Includes MS750 receiver, Configuration Toolbox software, operating manual, power/data cable, data/1 PPS cable

PHYSICAL CHARACTERISTICS

Size	14.5cmW × 5.1cmH × 23.9cmD (5.7²W × 2.0² H × 9.4²D)
Weight	1.0 kg (2.25 lbs)
Power	12VDC/24VDC, 9 Watts

ENVIRONMENTAL CHARACTERISTICS

Operating temp	-20°C to +60°C
Storage temp	-30°C to +80°C
Humidity	MIL 810 E, Meth. 507.3 Proc III, Aggravated, 100% condensing
Vibration	MIL 810 D, Tailored Random 3gRMS Operating Random 6.2gRMS Survival
Mechanical Shock	MIL 810 D ± 40 g Operating ± 75 g Survival
EMC	
Radiated Emissions	CISPR 12
Conducted Emissions	SAE J1113/41
Radiated Immunity	ISO/DIS 13766, 30V/m
ESD	±15KV
Input Voltage Transients	ISO 7637-2

TECHNICAL SPECIFICATIONS

Tracking	9 channels L1 C/A code, L1/L2 full cycle carrier Fully operational during P-code encryption		
Signal processing	Supertrak Multibit Technology Everest Multipath Suppression		
Positioning mode	**Accuracy**[1]	**Latency**[2]	**Max Rate**
Synchronized RTK	1cm+ 2ppm Horizontal 2cm+ 2 ppm Vertical	300ms[3]	5 Hz Std
Low Latency	2cm+ 2ppm Horizontal[4] 3cm+ 2 ppm Vertical	< 20ms	20Hz
DGPS	< 1m	< 20ms	20Hz

[1] 1 sigma level
[2] At maximum output rate
[3] Dependent on data link throughput
[4] Assumes 1 second data link delay

Initialization	Automatic OTF (on-the-fly) while moving
Time required	Typically < 1 minute
Range	Up to 20 km from base for RTK
Start-up	< 90 seconds from power on to positioning < 30 seconds with recent ephemeris
Communications	3 × RS-232 ports. Baud rates up to 115,200 2 × CAN/J1939
Configuration	Via front panel display & keypad, Configuration Toolbox Software or user definable application files
Output Formats	NMEA-0183: GGK, GGA, ZDA, VTG, GST, PJT and PJK Trimble Binary Streamed Output

Trimble

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YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

Trimble 5700 GPS System

One receiver, many configurations, for greater flexibility and choice

The Trimble® 5700 GPS receiver is an advanced, but easy-to-use, surveying instrument that is rugged and versatile enough for any job.

Combine your 5700 with the antenna and radio that best suit your needs, and then add the Trimble controller and software of your choice for a total surveying solution. The powerful 5700 GPS system will provide all the advanced technological power and unparalleled flexibility you need to increase your efficiency and productivity in any surveying environment.

Advanced GPS receiver technology

The 5700 is a 24-channel dual-frequency RTK GPS receiver featuring the advanced Trimble Maxwell™ technology for superior tracking of GPS satellites, increased measuring speed, longer battery life through less power use, and optimal precision in tough environments. WAAS and EGNOS capability lets you perform real-time differential surveys to GIS grade without a base station.

Modular design for versatility

For topographic, boundary, or engineering surveying, clip the receiver to your belt, carry it in a comfortable backpack, or configure it with all components on a lightweight range pole. With the receiver attached to your site vehicle, you can survey a surface as fast as you can drive! For control applications, attach the receiver to a tripod...it's designed to work the way your job requires.

Full metal jacket...and lightweight

The 5700 GPS receiver boasts the toughest mechanical and waterproofing specs in the business. Its magnesium alloy case is stronger than aluminum, but also 30% lighter—the 5700 weighs just 1.4 kg (3 lb) with batteries. Whether you're collecting control points on a tripod, or scrambling down a scree slope collecting real-time kinematic data, the receiver is light enough and tough enough to carry on performing.

Fast and efficient data storage and communications

Use the receiver's CompactFlash memory to store more than 3,400 hours of continuous L1/L2 data collection at an average of 15-second intervals. Transfer data to a PC at speeds of more than 1 megabit per second through the super-fast USB port. Your choice of UHF radio modem is built in to the receiver to provide RTK communications receiving without the need for cables or extra power!

Your choice of Trimble antenna

Choose the high-accuracy Trimble GPS antenna that best suits your needs: the lightweight and portable Zephyr™ antenna for RTK roving, or the Zephyr Geodetic™ antenna for geodetic surveying.

The Zephyr Geodetic antenna offers submillimeter phase center repeatability and excellent low-elevation tracking, while the innovative design of its Trimble Stealth™ ground plane literally burns up multipath energy using technology similar to that used by stealth aircraft to hide from radar. The Zephyr Geodetic antenna thus provides unsurpassed accuracy from a portable antenna.

Key Benefits

- Industry-leading technology provides superior performance
- Flexible configurations put you in total control
- Rugged, high-performance hardware is built to last
- With the Trimble controller and software of your choice, enjoy seamless integrated surveying

Trimble.

Trimble 5700 GPS System

General

- Front panel for on/off, one-button-push data logging, CompactFlash card formatting, ephemeris and application file deletion, and restoring default controls
- LED indicators for satellite tracking, radio-link, data logging, and power monitoring
- Tripod clip or integrated base case

Performance specifications

Measurements

- Advanced Trimble Maxwell technology
- High-precision multiple correlator L1 and L2 pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurement data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise L1 and L2 carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- L1 and L2 Signal-to-Noise ratios reported in dB-Hz
- Proven Trimble low-elevation tracking technology
- 24 Channels L1 C/A Code, L1/L2 Full Cycle Carrier, WAAS/EGNOS.

Code differential GPS positioning[1]

Horizontal . . . . . ±(0.25 m + 1 ppm) RMS
Vertical . . . . . ±(0.5 m + 1 ppm) RMS
WAAS differential positioning accuracy typically <5 m 3DRMS[2]

Static and FastStatic GPS surveying[1]

Horizontal . . . . . ±5 mm + 0.5 ppm RMS
Vertical . . . . . ±5 mm + 1 ppm (× baseline length) RMS

Kinematic surveying[1]

Real-time and postprocessed kinematic surveys
Horizontal . . . . . ±(10 mm + 1 ppm) (× baseline length) RMS
Vertical . . . . . ±(20 mm + 1 ppm) RMS
Initialization time . . . . . Single/Multi-base minimum 10 sec + 0.5 times baseline length in km, up to 30 km
Scalable GPS infrastructure initialization time . . . . . <30 seconds typical anywhere within coverage area
Initialization reliability[3] . . . . . Typically >99.9%

Hardware

5700 GPS receiver

Physical:
Casing . . . . . Tough, lightweight, fully sealed magnesium alloy
Waterproof . . . . . Tested to IPX7 standards
Shock and vibration . . . . . Tested and meets the following environmental standards:
Shock . . . . . MIL-STD-810F to survive a 1 m (3.28 ft) drop onto concrete
Vibration . . . . . MIL-STD-810-F on each axis
Weight . . . . . With internal batteries, internal radio, internal battery charger, standard UHF antenna: 1.4 kg (3 lb)
As entire RTK rover with batteries for greater than 7 hours, less than 4 kg (8.8 lb)
Dimensions (W×H×L) . . . . . 13.5 cm × 8.5 cm × 24 cm (5.3 in × 3.4 in × 9.5 in)

Electrical:
Power . . . . . DC input 11 to 28 V DC with over voltage protection
Power consumption . . . . . 2.5 W receiver only, 3.75 W including internal radio
Battery . . . . . Greater than 10 hours data logging, or greater than 7 hours of RTK operation on two internal 2.0 Ah lithium-ion batteries
Battery weight . . . . . 0.1 kg (3.5 oz)
Battery charger . . . . . Internal with external AC power adapter; no requirement for external charger
Power output . . . . . 11.5 to 20 V DC (Port 1), 11.5 to 27.5 V DC (Port 3) on external power input
Certification . . . . . Class B Part 15 FCC certification, CE Mark approved, C-Tick approved, Canadian FCC

Environmental:
Operating temperature[4] . . . . . -40 °C to 65 °C (-40 °F to 149 °F)
Storage temperature . . . . . -40 °C to 80 °C (-40 °F to 176 °F)
Humidity . . . . . 100%, condensing

Communications and data storage:

- 2 external power ports, 2 internal battery ports, 3 RS232 serial ports
- Integrated USB for data download speeds in excess of 1 Mb per second
- External GPS antenna connector
- CompactFlash advanced lightweight and compact removable data storage. Options of 64 MB or 128 MB from Trimble
- More than 3,400 hours continuous L1+L2 logging at 15 seconds with 6 satellites typical with 128 MB card
- Fully integrated, fully sealed internal UHF radio modem option
- GSM, cellphone, and CDPD modem support
- Dual event marker input capability
- 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning and data logging
- 1 pulse per second output capability
- CMRII, CMR+, RTCM 2.*x* and 3.*x* input and output standard
- 14 NMEA outputs

Zephyr antenna

Dimensions . . . . . 16.2 cm (6.38 in) diameter × 6.2 cm (2.44 in) height
Weight . . . . . 0.55 kg (1.20 lb)
Operating temperature . . . . . -40 °C to 70 °C (-40 °F to 158 °F)
Humidity . . . . . 100% humidity proof, fully sealed
Shock and vibration . . . . . Tested and meets the following environmental standards:
Shock . . . . . MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
Vibration . . . . . MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain

Zephyr Geodetic antenna

Dimensions . . . . . 34.3 cm (13.5 in) diameter × 7.6 cm (3 in) height
Weight . . . . . 1.31 kg (2.88 lb)
Operating temperature . . . . . -40 °C to 70 °C (-40 °F to 158 °F)
Humidity . . . . . 100% humidity proof, fully sealed
Shock and vibration . . . . . Tested and meets the following environmental standards:
Shock . . . . . MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
Vibration . . . . . MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain
- Trimble Stealth ground plane for reduced multipath

1 Accuracy may be subject to conditions such as multipath, obstructions, satellite geometry, and atmospheric parameters. Always follow recommended survey practices.
2 Depends on WAAS/EGNOS system performance.
3 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
4 Receiver operates normally to -40 °C (-40 °F) but some office-based functions such as USB download or internal battery charging are not recommended at temperatures below freezing.

Specifications subject to change without notice.

YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

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Trimble

DESCRIPTION

The Innerspace Technology Model 455 Survey Depth Sounder provides analog and digital depth on high resolution LCD display screens. The small, lightweight unit is ideal for use on small boats for hydrographic and GIS surveys, and also has applications on general purpose workboats and Corps of Engineers reconnaissance vessels. The 455 has most of the capabilities of Innerspace's legendary thermal printing depth sounder recorders, except for the thermal chart recording, plus it has many new features. Designed with the operator in mind, the easy-to-use menu is controlled via up / down, left / right arrows; no numerical entries are required and, when power is turned off, all entries are saved for next power on. In the operation mode, operator entries are always in view on the LCD display screen, along with the large numeral, digitized depth. The 455's analog display provides a continuous, high resolution bottom profile with alphanumerical annotation of pertinent information including: Speed-of-Sound, Tide, Draft, Time and Fix Number. For a hard copy, a screen print of the analog data may be sent to a standard computer printer or it can be stored internally on a 24 or 48 mb integrated circuit for later recall.

MODEL 455

SPECIFICATIONS

GRAPHIC DISPLAY

- 640 x 480 Pixel Monochrome Transflective LCD with Backlight and Contrast Control
- 5 ¾ in. x 4 ¾ in. viewing area
- Emulates paper chart recorder

NUMERIC DISPLAY

- 4 lines x 40 characters with large 1 in. high numerics and Backlight

OPERATION

- Menu driven parameter selection on alphanumeric display

PARAMETER SELECTION

- Speed-of-Sound, Tide, Draft, Gate Width, Scale, Backlight, Com Ports and many more

RESOLUTION

- .1 Unit graphic and numeric

DEPTH RANGES

- 0-45, 40-85, 80-125, 120-165, 160-205 Feet or Meters (dm and cm selection)
- Multipliers: 1, 2, 10
- Auto Ranging

ANNOTATION

- LCD graphic display numerically displays Speed-of-Sound, Tide, Draft, Date, Time, Depth, Fix number and GPS Data

TRANSMITTER

- Front panel switch selectable power levels: 250 watts to 10 watts in 4 levels

RECEIVER

- Time varied automatic gain adjustment under microprocessor control 20 or 30 Log
- Front panel manual gain control 20db
- Adjustable Blanking

DIGITIZER

- Range Gated (selectable widths)
- Initial Depth Entry
- 4 Modes of Operation
- Gate Mark on Graphic Display

UTILITIES

- Depth Simulator
- Chart Speed
- Screen capture to memory

INPUTS/OUTPUTS

- RS232 Port A
- RS232 Port B
- RS232 Port C
- Parallel Port
- Keyboard and VGA Port
- GPS Antenna with GPS option
- Floppy Port

TRANSDUCER

- 200kHz 3°

POWER

- 12VDC, 2½ Amp

ENCLOSURE

- Drawn aluminum case
- Aluminum panel painted to resist corrosion.
- Removable handle and soft carry bag included.

OVERALL SIZE

- 13 in. Wide x 9 in. High x 9 in. Deep
- 38.1 cm Wide x 22.86 High x 22.86 Deep

WEIGHT

- 15 lb.
- 6.8 kg

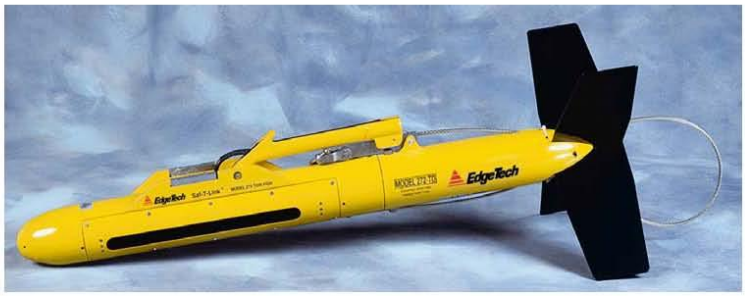
OPTIONS:

- Heave sensor
- Remote VGA display
- Tabletop / overhead mounting bracket
- Custom annotation (1 Line 40 Characters)
- Remote readout (large numeric)
- Continuous analog storage, 48mb
- AC power supply
- Portable transducer mounts
- Floppy Disk Drive in travel case
- Mini keyboard (89 key) and adapter cable
- 125 kHz transceiver and transducer 125kHz 7º
- Laplink software
- Color graphic display

EdgeTech

4100 SIDE SCAN SONAR SYSTEM

The long-lasting affordable workhorse of hydrographic surveying.



EdgeTech 272-TD Towfish

EdgeTech Model 4100-P
Portable Topside Processor

The ***EdgeTech 4100 Side Scan Sonar System*** is the long-lasting affordable workhorse of hydrographic surveying. The system comes standard with either a 19 inch rack mount or portable topside processor running EdgeTech's DISCOVER acquisition software along with a dual frequency 100/500 kHz towfish (model 272-TD).

With the portable 4100-P topside processor, the electronics are housed in a water resistant "suitcase-style" case and the sonar data is displayed on a supplied laptop via a wired [Ethernet] or wireless connection. The supplied laptops are the most current available on the market today and run in a Windows XP environment. The 4100 rack mount version offers the same specifications and operating system however in a standard 19 inch configuration.

The 4100 System can be custom tailored to specific requirements through EdgeTech software with such performance enhancing features as selectable operating frequency (100 kHz or 500 kHz), selectable color palettes, and display of towfish altitude.

The 272-TD towfish also comes standard with EdgeTech's patented Saf-T-Link® system which allows for safe recovery of the towfish if it becomes snagged on a seafloor obstruction.

Features:

- 2 channel side scan display
- NMEA 0183 navigation input
- Image correction
- Mosaic generation (optional)
- Target, capture, zoom, view, measure, store, and compare
- Selectable color palettes
- 25 to 500 meter swath

Applications:

- Hydrographic surveys
- Channel clearance surveys
- Search and recovery
- Location of potential seafloor hazards
- Cable and pipeline surveys
- Mine counter measure surveys
- Site selection surveys, pre/post dredging surveys

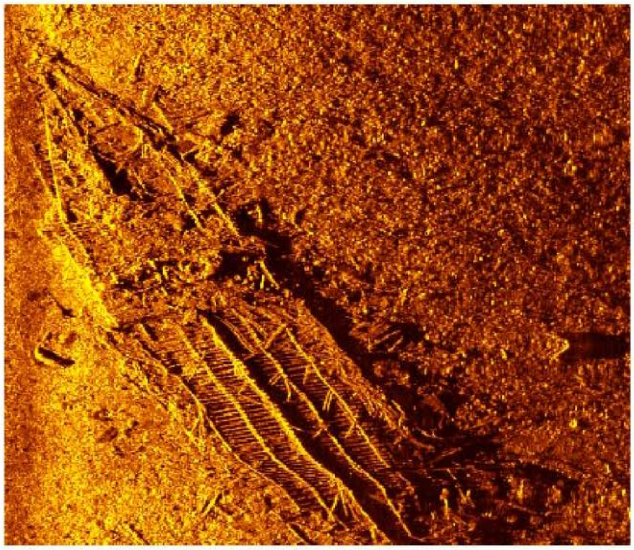
4100 SIDE SCAN SONAR SYSTEM

Key Specifications

272-TD Towfish	
Frequency	100 kHz - 105 ± 10 kHz, 500* kHz - 390 ± 20 kHz
Horizontal Beam Width	100 kHz - 1.2° (3 dB points), 500* kHz - 0.5° (3 dB points)
Operating Range (maximum)	100 kHz - 500 meter swath, 500* kHz - 200 meter swath
Optimum Operating Depth	75-100 meters (depending on tow characteristics)
Tow Cable Type	7 conductor
Tow Fish Diameter	11.4 cm (4.5")
Tow Fish Length	140 cm (55")
Towing Speed (operational)	3 - 5 knots
Weight (in air)	25 kg (55 lbs)
Weight (in saltwater)	12 kg (26 lbs)

**Note: Actual operating frequency is 390 kHz ± 20 kHz*

Specifications subject to change without notice.



4100 image of flattened shipwreck

Model 4100 Rack Mount Topside Processor

Other EdgeTech Products

✓ Side Scan, Sub-bottom, Integrated and Modular Imaging Systems for Deep Towed, AUV, ROV and Other Applications utilizing Full Spectrum, MultiPing or Synthetic Aperture Acquisition and Processing Techniques.

EdgeTech

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